

Clear-Com | IP-Transceiver

Ubiquiti Transport

Version 2
Author: Jonathan Sorensen, Sarah Koehler
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Last Edit Contributor: Jonathan Sorensen, Sarah Koehler

- 1 Goal 2
- 2 Guidelines 2
- 3 Success Validation..... 2
- 4 Main Test Flow..... 3
 - 4.1 System Under Test 3
 - 4.2 Required Equipment 5
- 5. Steps for programming and testing the UUT Unit-Under-Test (UUT) 6
 - 5.1 Network 6
 - 5.2 PTP 7
 - 5.3 Ubiquiti AirFiber 9
 - 5.4 EHX Setup..... 11
- 6 System Setup..... 12
- 7 Mandatory Step 13
- 8 Additional Steps..... 14

1 Goal

Remotely connect a FreeSpeak II IP-Transceiver (IPT) using Ubiquiti AirFiber 24 GHz K-Band Radios

2 Guidelines

In initial POC for IPT use over Ubiquiti AirFiber technology, PTP was offset too far from master to provide reliable PTP Lock and DECT Sync.

-Use of dedicated PTP leader clocks on each end believed to be a viable solution to overcome.

Intended end use at remote location will have limited connectivity, ideally just the IPT connected to the AirFiber Remote Unit.

3 Success Validation

To be successful, a single IPT (at a minimum) must connect and provide reliable PTP and DECT Sync and allow a FreeSpeak II 1.9GHz beltpack to successfully connect, transmit and receive audio, and freely roam from the main RF zones into the RF zone provided by the remote antenna.

4 Main Test Flow

4.1 System Under Test

PTP-2 SFP Master Clock ADVA OSA-5401 (GPS Lock Required via GNSS Antenna)

- Version: current to test date 4.12.2022
 - o IP: 192.168.0.3

Connected directly to IPT (LAN-3):

- Version 4.13.67.2
 - o AoIP Admin: 192.168.0.71
 - o AoIP Audio: 192.168.0.72

Connected directly to Ubiquiti AirFiber REMOTE Unit

- Version: current to test date 4.12.2022
 - o IP: 192.168.0.202

Connected via 24 GHz K-Band to Ubiquiti MASTER Unit

- Version current to test date 4.12.2022
 - o IP: 192.168.0.201

Connected to Cisco SG350 Series Switch (Port 9 in this example)

- Version: Tesla 2.5.8.15
 - o IGMP Snooping
 - o IGMP Querier
 - o IPv4-Based ACL
 - DENY Source 192.168.0.2 EGRESS to Ubiquiti Master Port

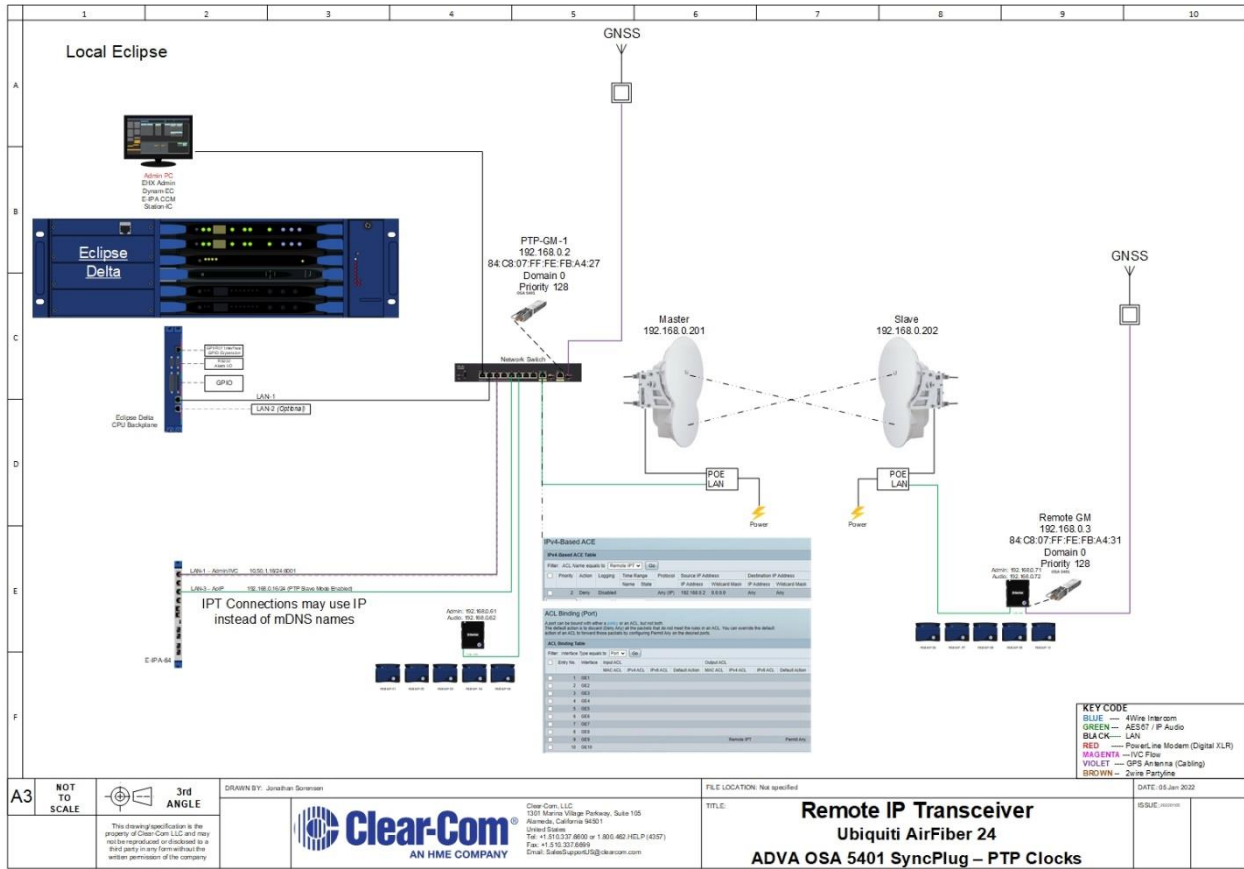
E-IPA AoIP (AES67) Connected to Cisco SG350 (Port 5 in this example)

- Version: 6.98.63.0
 - o IP: 192.168.0.16
 - o PTP Member-Only Mode
 - o Using AES67 Profile
 - Announce Interval: +1 (2s)
- EHX Version: 12.2

PTP-2 SFP Master Clock ADVA OSA-5401 (GPS Lock Required via GNSS Antenna)

- Version: current to test date 4.12.2022
 - o IP: 192.160.2

See drawing on next page for reference



4.2 Required Equipment

- 1x computer with
 - Windows 10 (or equivalent capable of running required software)
 - EHX Version 12.2 or newer
 - Web Browser access to devices for configuration
 - Recommended Software:
 - WireShark
 - PTP Trackhound
- 1x Eclipse Matrix
 - 1x E-IPA with suitable license
- 2x IP-Transceiver 1.9GHz
- 2x Ubiquiti AirFiber 24 GHz K-Band
- 2x SFP SyncPlugs (ADVA OSA-5401)

5. Steps for programming and testing the UUT Unit-Under-Test (UUT)

5.1 Network

- Cisco SG350 (or equivalent)
 - o Create VLAN for use with AoIP Subnet 192.168.0.254/24 (VLAN ID 1920 for example)
 - o Assign VLAN to E-IPA AoIP and Ubiquiti Master ports
 - o Assign VLAN to PC Port, so that it can manage switch and see AoIP VLAN
 - o Enable Multicast > IGMP Snooping for VLAN ID 1920
 - o Enable Multicast > IGMP Querier for VLAN ID 1920
 - o Connect E-IPA to switch and note port (5 in example)
 - o Connect Ubiquiti Master Unit to switch and note port (9 in this example)
 - o Create IPv4 ACL (Remote IPT in this example)
 - o Create IPv4 ACE
 - Priority 2: Deny Source 192.168.0.2 to Destination ANY
 - o Bind the ACL to Port 9 EGRESS with a default ALLOW ANY

5.2 PTP

Remote Clock - ADVA OSA 5401 SyncPlug (In this Example)

- Plug the first clock into the switch, this will be setup for the REMOTE Unit
 - o SSH to the Default IP: 192.168.0.2
 - User: root
 - PW: ChgMeNOW
 - o Set the IP Address
 - #configure interface mgmt+ptp1 ip-address ipv4 192.168.0.3/24
 - o Set the Gateway
 - #configure interface mgmt+ptp1 default-gw ipv4 192.168.0.254
 - o Set the VLAN ID
 - #configure interface mgmt+ptp1 vlan-id 1920
 - o Set the VLAN Priority
 - #configure interface mgmt+ptp1 vlan-pcp 7
 - o configure clock I3-profiles
 - #configure clock I3-profiles master multicast no shutdown
 - #configure clock I3-profiles master multicast interface add ptp1
 - #configure clock I3-profiles profile aes67-media
 - #configure clock I3-profiles master type two-step
 - #configure clock I3-profiles master multicast rate announce ½ (4)
 - #configure clock I3-profiles master domain-number 0
 - Optional: change Priority1 xx (128 in this example)
 - Optional: change Priority2 xx
 - Annc Rate - comes in at 1s, need to change to 1/2s
configure clock I3-profiles master multicast rate announce ____
 - Sync-Rate - comes in at 128/s, need to change to 8/s
configure clock I3-profiles master multicast rate sync ____
 - o Save the configuration
 - #save-and-reconfig
 - o Verify the configuration
 - #show running-config

Local Clock - ADVA OSA 5401 SyncPlug (In this Example)

- Plug the first clock into the switch, this will be setup for the REMOTE Unit
 - o SSH to the Default IP: 192.168.0.2
 - User: root
 - PW: ChgMeNOW
 - o Set the IP Address
 - #configure interface mgmt.+ptp1 ip-address ipv4 192.168.0.2/24
 - o Set the Gateway
 - #configure interface mgmt.+ptp1 default-gw ipv4 192.168.0.254
 - o Set the VLAN ID
 - #configure interface mgmt.+ptp1 vlan-id 1920
 - o Set the VLAN Priority
 - #configure interface mgmt.+ptp1 vlan-pcp 7
 - o configure clock l3-profiles
 - #configure clock l3-profiles master multicast no shutdown
 - #configure clock l3-profiles master multicast interface add ptp1
 - #configure clock l3-profiles profile aes67-media
 - #configure clock l3-profile master type two-step
 - #configure clock l3-profiles master multicast rate announce ½ (4)
 - #configure clock l3-profiles master domain-number 0
 - Optional: change Priority1 xx (128 in this example)
 - Optional: change Priority2 xx
 - Annc Rate - comes in at 1s, need to change to 1/2s
configure clock l3-profiles master multicast rate announce ____
 - Sync-Rate - comes in at 128/s, need to change to 8/s
configure clock l3-profiles master multicast rate sync ____
 - o Save the configuration
 - #save-and-reconfig
 - o Verify the configuration
 - #show running-confi

5.3 Ubiquiti AirFiber

First Device (to be Master)

- Connect to the CONFIG port on the unit and power up (reset to default by holding reset for 5+ seconds as needed)
 - Log into unit via default IP <https://192.168.1.20>
 - User: ubnt
 - Password: ubnt
 - Set Device IP: Settings > Network
 - Set IP Address: 192.168.0.201
 - Set Netmask: 255.255.255.0
 - Set Gateway: 192.168.0.254
 - Data Port Ethernet Settings
 - Disable Multicast Filtering
 - Save Changes
 - Log into new device IP
 - User: ubnt
 - Password: ubnt
 - Set Device to Master: Settings > Wireless
 - Wireless Mode: Master
 - Duplex: Full Duplex
 - Strict Timing: ON
 - Frequency Settings:
 - TX: 24.1 GHz
 - RX: 24.2 GHz
 - Save Changes

Second Device (to be Slave)

- Connect to the CONFIG port on the unit and power up (reset to default by holding reset for 5+ seconds as needed)
 - Log into unit via default IP <https://192.168.1.20>
 - User: ubnt
 - Password: ubnt
 - Set Device IP: Settings > Network
 - Set IP Address: 192.168.0.202
 - Set Netmask: 255.255.255.0
 - Set Gateway: 192.168.0.254
 - Data Port Ethernet Settings
 - Disable Multicast Filtering
 - Save Changes
 - Log into new device IP
 - User: ubnt
 - Password: ubnt
 - Set Device to Master: Settings > Wireless
 - Wireless Mode: Slave
 - Duplex: Full Duplex
 - Strict Timing: ON
 - Frequency Settings:
 - TX: 24.2 GHz
 - RX: 24.1 GHz
 - Save Changes

Mount/Place radios

Verifying Link

- The 2 devices use the LINK NAME to register the slave to the master.
 - This can be modified for multiple systems or custom names
 - Settings > System
 - Device > Device Name
- Log into the Master Unit
 - In Dashboard, monitoring BEACONNING, REGISTRATION, and LINK STATUS
 - Under Signal Strength, you will see recommended "IDEAL POWER" shown
 - Go to Settings > Wireless
 - Output Power: enter "IDEAL POWER"
 - Save Changes

For more in-depth setup and verification of Ubiquiti AirFiber units, please consult Ubiquiti Manuals or support.

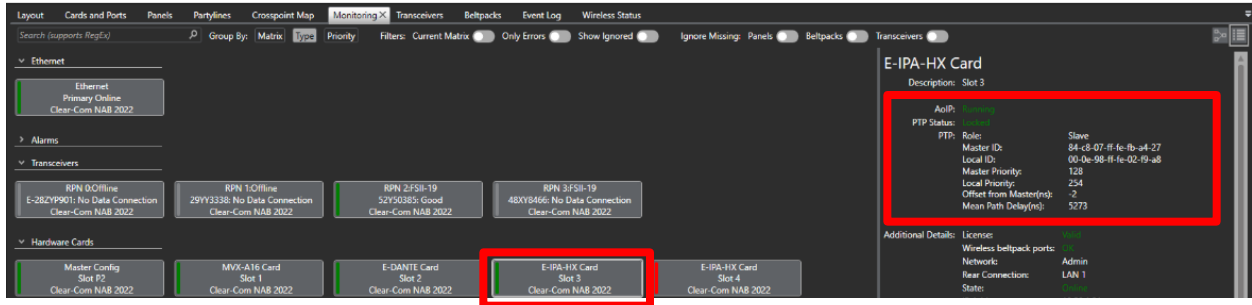
5.4 EHX Setup

- EHX > Hardware > Cards and Ports
 - Configure E-IPA
 - AoIP IP Address: 192.168.0.16 (in this example)
 - Protocol Settings
 - PTP Follower Mode: Enabled
 - Profile: AES67
 - Announce Interval: +1 (2s)
 - Add Ports for Wireless Beltpack
 - Assign Beltpack Roles
 - Configure IPT
 - AoIP Admin IP Address: 192.168.0.71/24/.254
 - AoIP Audio IP Address: 192.168.0.72/24/.254
 - Add to EHX Transceivers
 - Register Beltpacks
 - Apply Map to Matrix

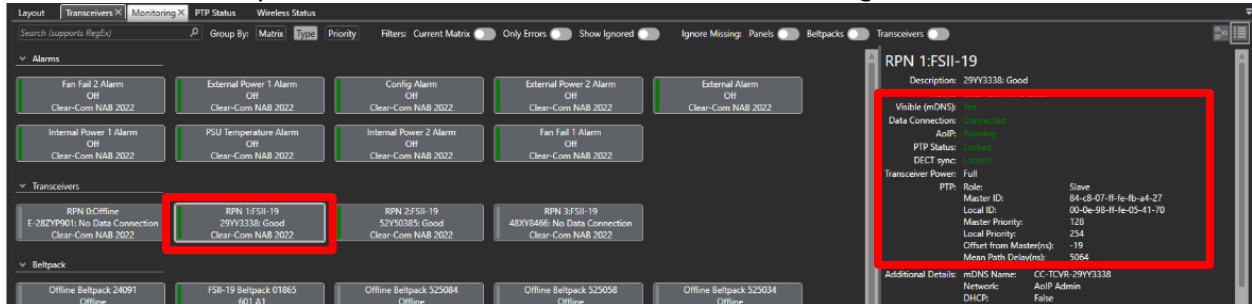
If additional support is needed for EHX Setup, please contact Support@clearcom.com or the assigned AE to your project.

7 Mandatory Step

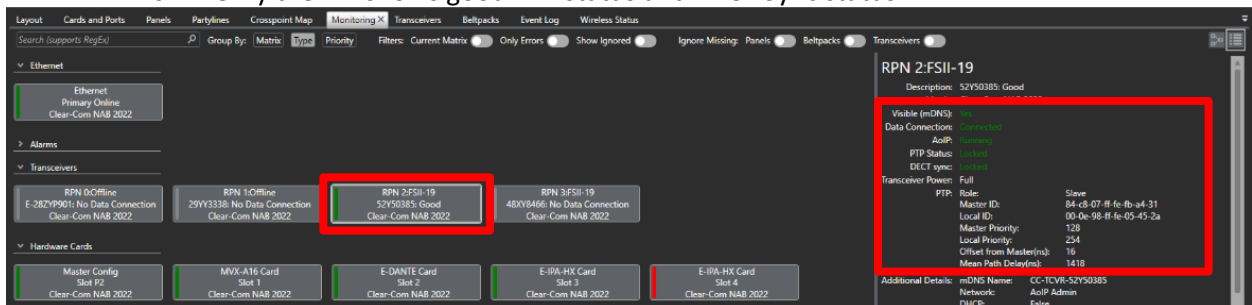
- Using PTP Trackround and EHX Monitoring:
 - o verify the E-IPA card is locked to PTP-GM-1 and shows good status.



- o Verify the "Local" IPT is locked to PTP-GM-1 and shows good status.



- o Verify the Remote IPT is locked to PTP-GM-2 and shows good status.
- o Verify the IPT shows good PTP status and DECT Sync status.



- Perform a talk test between a local device and a remote beltpack
- Perform a roaming test using a beltpack to roam between a local IPT and the Remote IPT

8 Additional Steps

-Test with IVC Connected Panel – verify audio and data
- Confidence in application based on IP-Transceiver POC

-Test with AoIP Connected panel – verify audio and data
-Confidence in application based on IP-Transceiver POC

-Test with IP-Transceiver – verify DECT and audio

-Completed 4.6.2022

-EHX 12.2

-E-IPA 6.98.63.0

***This test confirmed FreeSpeak coverage at the remote transceiver while showing seamless roaming between the locally connected FreeSpeak Transceiver and the Remote Transceiver.*